ENVIRONMENTAL JUSTICE COLLABORATIVE PROBLEM-SOLVING (EJCPS) COOPERATIVE AGREEMENT PROGRAM (EPA-OECA-OEJ-14-01)

One-Page Threshold Eligibility Form:

Protectores de Cuencas (PDC) is a science and community based incorporated nonprofit organization in Puerto Rico helping to restore and protect watersheds (cuencas) across the territory with vast experience working with the communities in Guánica, Lajas, Fajardo, Culebra, and Vieques. The organization is located within the same Commonwealth where the proposed project will be located. This project will work with four communities in Puerto Rico impacted by water pollution that compromises public health at beaches and limits water contact recreational activities which are one of Puerto Rico's most important economic assets, these locations are: Vieques, Fajardo, Guánica and Rincón. Contamination in coastal areas from sewage, failing septic systems is relatively common and threatens human health, water contact recreation and the health of coastal ecosystems. The purpose of this project is to identify and begin to remediate sources of illicit discharge (IDDE) pollution in each priority site. Community groups, NGOs, municipal, national and federal agencies will work together with PDC at each site to assist in identifying the sources of pollution, and remediate those sources. PDC will transfer technical knowledge to the local groups and provide assistance to responsible parties to implement best management practices (BMPs) to reduce pollution. As part of the project, basic water quality monitoring technology would be provided to the local entities so that they can continue to track and remediate water contamination.

This project directly relates to the following two federal environmental statutes:

The Clean Water Act, Section 104(b) (3) - The act promotes the coordination of research and training through demonstration projects to identify, remediate and ultimately prevent sources of pollution affecting rivers, streams and/or marine ecosystems.

The Clean Water Act, Section 402, NPDES (National Pollution Discharge Elimination Service) Permit Process and the 6 minimum measures, where each jurisdiction must create a program to detect and eliminate illicit discharges.

The Marine Protection, Research, and Sanctuaries Act, Section 203: All of the project's work sites are located along the coast. This project will determine means of minimizing and ending dumping of pollutants into ocean waters by identifying land based sources of contamination that currently represent a threat to human health and the marine environment. In addition it will build capacity of local stakeholders to continue minimizing and remediating sources of pollution.

Activities:

PDC in conjunction with partner organizations will conduct water quality testing activities (also known as Illicit Discharge Detection and Elimination (IDDE)) in urban and rural areas within each priority area to track and remediate sources of contamination. Partners will participate in these activities, have an opportunity to be a part of the follow up process and have meaningful involvement in decisions about remediating water pollution. PDC will help to facilitate communication with regulatory and responsible entities including PRASA Puerto Rico Aqueduct and Sewerage Authority (PRASA), local municipalities, Environmental Quality Board (EQB), the Department of Natural and Environmental Resources (DNER), and the EPA.

I. Work Plan:

A. Project Title and Project Purpose Statement

Title: ¡Salud para la Comunidad!: Tracking Pollution and Contamination and Empowering Community Response in Four Priority Locations in Puerto Rico.

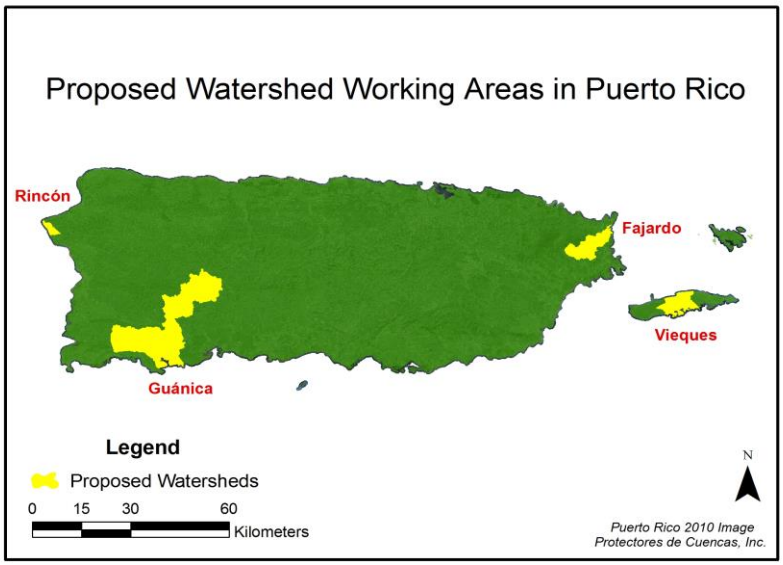
Purpose Statement: This project will identify sources of pollution and contamination in the following four priority sites: Vieques, Fajardo, Guánica and Rincón in the Commonwealth of Puerto Rico. Community groups, non-governmental organizations (NGOs), municipal, national and federal authority representatives at each of the four sites will work together to assist PDC in identifying the sources of pollution and work on remediation of these sites. Often in coastal communities of Puerto Rico, there are many small sources of contamination that add up to significant contamination of coastal ecosystems (Norat and Matthei, 2006, Sturm et. al. 2014). The frequent reliance on on-site septic systems in poor soils and inadequate historic design standards for septic and sewer systems results in excessive contamination and risks to coastal communities with limited resources in Puerto Rico. The purpose of this project is to identify and begin to remediate sources of illicit discharge pollution in each priority site. Partner organizations with whom we have established a Memoranda of Agreement (MOA) include: the Department of Natural and Environmental Resources (DNER), Ridge to Reefs, Inc (RTR), Vieques Historical and Conservation Trust (VHCT), Kayaking Puerto Rico (KPR), Asociación de Pescadores (Fisherman) de Maternillo y Mansión del Sapo, and Surfrider Foundation Rincón (SFR). PDC proposes to transfer technical knowledge to these groups and provide assistance to responsible parties to implement BMPs and actions to reduce pollution. PDC will also provide them with basic water quality monitoring technology so that they can continue to track and remediate water contamination. The project will involve working with communities in Puerto Rico impacted by water pollution that compromises public health at beaches and limits water contact recreational activities which are one of Puerto Rico's most important assets. Historically marginalized and impacted communities including Vieques (as population displacement and a bombing range where low level radioactive and other harmful bombing components were tested), as well as the Rincón area (site of the BONUS nuclear reactor that leaked radiation in the 1970s) on the northwest coast of Puerto Rico important for coral reefs and surfing.

An example of a similar past project is in La Parguera (Lajas, PR) where we worked with students from University of Puerto Rico (UPR) and other community volunteers to identify 20 – 30 sources of contamination and have collaborated with PRASA and EPA to have the majority of those potential sources of contamination remediated. Most of the problems required small technical fixes including opening connections from the sanitary sewer to houses that had been destroyed by fire or hurricanes over the last 30 years. This project represents a significant accomplishment for PDC and a very similar project to the one proposed.

Project Locations: The following areas represent 1st or 2nd tier priority sites for the Government of Puerto Rico in its prioritization of watersheds for the protection and restoration of coral reefs

- Vieques, PR 00765
- Guánica, PR 00653

- Rincón, PR 00677
- Fajardo, PR 00738



Project Statutes:
This project directly relates to the following two federal environmental statutes:

The Clean Water Act, Section 104(b) (3) - The act promotes the coordination of research and training through demonstration projects to identify, remediate and ultimately prevent sources of pollution affecting rivers, streams and/or marine ecosystems.

The Clean Water Act, Section 402, NPDES (National Pollution Discharge Elimination Service) Permit Process and the 6 minimum measures, where each jurisdiction must create a program to detect and eliminate illicit discharges.

B. Environmental and/or Public Health information about the Affected Community

Increased levels of land-based nutrient, sediment and bacteria loads associated with coastal development are one of the most important factors affecting coastal marine ecosystems in Puerto Rico. Puerto Rico coral reefs are among the most threatened marine ecosystems in the Caribbean. High contaminant loads to marine environments resulting from failing septic systems, leaking sewer lines and bare soils for roads or construction without the installation of proper best management practices are very common problems in the Caribbean region.

Coastal water quality degradation in Puerto Rico causes a decline in the population and health of coral reefs and compromises Puerto Rico's capacity of providing sound environmental conditions for water contact recreation. Gastrointestinal illnesses and ear, nose and throat infections can result from the exposure to contaminated waters. Cordero et al (2012) found seasonal changes in the risk of gastrointestinal (GI) illness of beachgoers in Luquillo. A higher incidence of GI illness was observed for bathers when compared to non-bathers during rainy season. Medina-Muñiz and Hernandez-Delgado (2010) demonstrated that increases in turbidity in coastal waters after rainfall contributes to a microbial growth spike, thus contributing to greater GI risk. Further, the ability of reefs to survive is gradually being compromised as the population grows, and fine sediment, nutrient and bacteria discharges from the land increase. From the point of view of the conservation of marine ecosystems, degradation of water quality due to land-based sources of pollution has negative and sometimes irreversible damage to the integrity of the coral reef communities, sea grasses, mangroves and other highly valued coastal ecosystems. High rates of sedimentation, excess nutrients from agriculture, urbanization and sanitary sewage overflow are the main causes of the degradation of marine ecosystems. This phenomenon is mainly due to the lack of sustainable management from the perspective of integrated coastal watershed management. Erosion and habitat degradation are other serious problems for our wetlands, estuaries and coastal waters. In

particular, the removal of vegetation and the movement of land for the construction of infrastructure and homes, in the absence of good practices to control erosion and sedimentation, marine and coastal ecosystems are impacted and the attractiveness of coastal areas for recreation and tourism is diminished. In the following paragraphs we describe the environmental and health challenges that each of the four priority sites confront today.

Rincón

The northwest coastal region of Puerto Rico (PR) is experiencing rapid growth and urban development leading to deforestation and the impacts associated with residential construction projects. These actions increase soil erosion, stormwater and septic pollution and pollutant loads to coastal waters. Rincón is a town within the northwest region with approximately 15,000 inhabitants, witnessing the same rapid growth. Rincón is not only known as "the town of beautiful sunsets" but also as the "capital of surfing" ever since the 1968 World Surfing Championships were held there. Surfing, snorkeling, SCUBA diving and other water-related sports and recreation are vital to the town's economic well-being. An economic survey sponsored by The Surfrider Foundation in 2004 determined that these activities were responsible for about half of the economic and tourism revenue generated in Rincón, approximately 60 million dollars per year at that time.

Rincón is also home of the Tres Palmas Marine Reserve (RMTP), the only co-managed marine protected area on mainland PR. The RMTP was designed to protect what recent surveys have shown to be reefs with the highest percentage of live coral coverage in PR waters, and specifically to protect what is recognized to be the healthiest and most genetically diverse stands of federally protected elkhorn coral *(acropora palmata)* in the Caribbean Basin. The RMTP has become the single most popular tourist destination beach for snorkeling in Rincón, and is a world-famous surf break during the winter months. A collaborative study completed in 2012 by Surfrider Rincon (SFR) and UPR Mayagüez Campus confirmed that the southern reaches of the RMTP experience persistent moderate fecal bacteria contamination, most probably the cause of the elkhorn coral disease 'patching necrosis' first detected in the RMTP in 2009, and likely due to local septic tank failures.

Our partner, SFR has been conducting a volunteer-staffed weekly marine and fresh water sampling and analysis program since 2007, using the EPA approved IDEXX Enterolert/Quantitray 2000 equipment and methods to detect enterococcus bacteria as an indicator of fecal contamination. The chapter has sampled from a minimum of 7 to a maximum of 20 sites weekly along the coastline from Isabela to Rincón over the past 7 years. The program has identified other statistically significant 'hotspots' of fecal contamination, on the beaches of Barrio Corcega in Rincón and Barrio Guaniquilla in Aguada, as well as profiling most of the fresh water outflows within their study area. All freshwater outflows show high to extremely high bacterial levels, with only moderate seasonal fluctuations (rainfall), leading to the conclusion that the contamination sources are almost certainly failed septic systems in the watersheds. The presence of excessive fecal bacteria compromises the health of the community and the quality of the coastal environment.

The Blue Water Task Force (BWTF) of SFR is the only on-going volunteer driven water quality monitoring being done in PR at this time, and it is recognized as providing regular, reliable and timely data concerning bacterial contamination to the public as well as entities such as UPR-

Mayaguez Campus, Sea Grant, the National Oceanic and Atmospheric Administration (NOAA) and Caribbean Coastal Ocean Service System (CariCOOS), all of which have been previous collaborators with SFR. SFR has reached out to PDC and Ridge to Reefs in the past looking to collaborate on identifying and pinpointing sources of contamination in its watersheds and this project represents a great opportunity for collaboration across Puerto Rico.

Fajardo

The eastern region of Puerto Rico, in the last fifteen years, has experienced the largest growth in infrastructure on the coast. The Fajardo River basin covers around 118 km^2 mostly within the municipalities of Fajardo and Ceiba, from the Luquillo Sierra to the Vieques Passage. Fajardo itself has received significant growth that is beginning to undermine the integrity of the area for recreation due to associated pollution. Private interest in the basin per se is growing, as evidenced by projects under way for flood control measures at the Fajardo River mouth, enlargement of the local airport, an increasing number of commercial farms, and residential and road construction projects." (Granna-Raffucci et. al., 1993). The effects of construction and alterations to natural landscapes contribute to erosion and sedimentation problems. Goenaga and Cintrón (1979), and Goenaga et al. (1990) cited possible increased discharge of freshwater and sediment from the Fajardo River as one cause for degradation of coral reefs and seagrass communities located off the Fajardo coast and at the nearby Arrecifes de la Cordillera Natural Reserve. (Granna-Raffucci et. al., 1993). In addition, recently, the Puerto Rico EQB, conducted a sampling of the Laguna Grande and Laguna Grande Canal of Fajardo and it reflected violations of water quality standards for fecal coliform and enterococci parameters in all seasons, showing that there are water pollution discharges in the area. In this regard the community of Las Croabas and tourism operators have expressed health concerns and interest in establishing an appropriate sanitary sewer system and water quality improvements as current septic systems do not work properly[1]. Furthermore, the northeast reserves surrounding Fajardo are probably the most important tourism area in Puerto Rico due to its proximity to the San Juan and the international airport. If these resources are destroyed, the economy and wellbeing will also suffer.

Vieques

Vieques is a 52 square mile island-municipality, with a population of 9,301, 73% of residents live below the federal poverty level. Vieques is located approximately 8 miles southeast of the main island of Puerto Rico. It has a permanent population of 9301[2] in an area of 52 square miles. The population balloons in the winter months, with increasing numbers of visitors from the US and abroad.

During the 1940s the US Navy expropriated two-thirds of the island forcibly relocating its residents into a 7000 acre strip of land located between the bombing ranges and the munitions depots. The expropriations caused a significant decline of the agriculture based economy. Thousands of Viequenses had to emigrate in search of employment. Until 2003 Vieques was used by U.S. and NATO forces for military training operations and emerged as the largest training and munitions testing area in the Atlantic basin[3].

---

[1] Newsroom El Mundo Puerto Rico. 2013. *Senate oversees the AAA in the case of Las Croabas in Fajardo.* http://english.elmundo.pr/4353/58700/a/senate-oversees-the-aaa-in-the-case-of-las-croabas-in-fajardo

[2] Census 2010

[3] Report by the President's Task Force on Puerto Rico's Status, May 2011

Following the departure of the US Navy in 2003, after 60 years of military occupation, Vieques' infrastructure and services are substandard. Many Viequenses live in poverty, with 73 percent of the residents living below the Federal poverty level. The median household income is $5,900, and Vieques has an unemployment rate of 22 percent. The Puerto Rico Department of Health's Cancer Registry found an elevated incidence of cancer among Island residents compared with the cancer rates for mainland Puerto Rico.[4] There is no full-service hospital on Vieques, and people have to travel off-island to obtain medical care and are transported by air for emergency services. The journey is problematic because residents of Vieques rely on an unreliable ferry service to transport them to and from the main Island. The ferry stops running at 6:00 p.m. and often does not run on time, or not at all in bad weather In 2011, stemming from the President's Task Force on the Status of Puerto Rico, EPA established the Vieques Sustainability Task Force (VSTF) to coordinate Federal and local efforts for comprehensive cleanup and remediation at the closed military range on Vieques. In addition, this task force will develop and implement policies that boost sustainable economic growth and job creation on Vieques. The areas the VSTF is addressing are Superfund Cleanup and Job Training, Solid Waste, Health Care for Residents of Vieques, Clean and Renewable Energy Options, Strengthening Vieques as a Green Tourist Destination, Watershed Protection of Bioluminescent Bay. Given the history of the Navy in Vieques, this project takes careful consideration of the opportunity for meaningful contributions from the public.

Traditional septic systems are the norm in most of the island. Most septic systems were built before recent building code requirements came into force. With the increasing density of building and with formerly single-family dwellings being converted to multi–family housing or rental units, effluent from these inefficient and antiquated systems are not being managed effectively. Instead it is making its way into the sea and causing potential serious health and pollution problems for the local population and for visitors. In addition during the rainy season, from June to November (which is also the hurricane season) short, steep, dry creeks become torrential rivers overflowing their banks and spewing their contents and surface detritus into the sea. Average precipitation during this season is around 6.3 inches per month. Visible pollution is evident after such rain events.

The island of Vieques has approximately 50 miles of coastline. Traditionally the population has been dependent on the sea for food and economic activities: small-scale artisanal commercial fishing; an increasing number of sports fishing operations; snorkeling, kayaking, paddle boarding and other water based tourism activities. Vieques is blessed with an abundance of beaches heavily used by local residents and visitors from the main island of Puerto Rico, the US and all over the world. The marine environment is critical to the economic and public health of this population.

Guánica

The Guánica Bay/Rio Loco (GB/RL) watershed is located in the southwestern corner of Puerto Rico, approximately 20 miles west of the city of Ponce. Due to human alteration, the watershed area was increased by 50% to approximately 151 square miles and discharges to Guánica Bay near the town of Guánica. The Guánica Bay/Rio Loco watershed includes the urbanized areas of Yauco, a portion of the Lajas Valley agricultural region, and the upper watershed where coffee farming and subsistence agriculture is practiced on steep often highly erodible slopes. The GB/RL is one

[4] Report by the President's Task Force on Puerto Rico's Status, May 2011

of the major riverine discharge points on the southwest coast. Historically, the area was associated with some of the most extensive and healthy reef complexes in Puerto Rico. Coral reefs have experienced an unprecedented decline over the past 30-40 years in the Caribbean by some estimates have lost greater than 50% of live coral and over 90% of sensitive and federally listed *Acropora palmata* (elkhorn) and *Acropora cervicornus* (staghorn) species. Meanwhile studies by scientists in Puerto Rico have suggested that important nutrient and sediment contaminants have increased by 5-10 times pre-colonial levels and several times in the last 40-50 years.

Historically urbanization, particularly after 1950, has two primary effects on the near shore coastal system; an increase in population and an increase in impervious cover and generation of stormwater. The increases in impervious cover result in increases in loading of nutrients, bacteria, sediments, Polycyclic Aromatic Hydrocarbons, heavy metals and other pollutants associated with automobiles. The increase in population also results in additional sewage being generated and discharged to the near shore coastal environment.

Discharge from sewage and septic systems are key sources of contamination in the watershed particularly along the coast. This is especially true in Guánica where much of the infrastructure in the town was built in the early 1900s and both sewer and stormwater conveyed in earthen channels and PVC pipes – and the system is inherently leaky, and often clogged and challenging to track sources of contamination through the aging infrastructure. This has resulted in a system where stormwater, wash water and sewage all mix carrying a cocktail of contaminants toward Guánica Bay where they are collected in a large open vault before being pumped several times a day into Guánica Bay. Furthermore, a NOAA study reported through a biogeographic assessment of the coral reef ecosystem outside the bay that contaminants (e.g., PAHs, PCBs, pesticides, heavy metals) magnitudes and distributions in surface sediments (inside the bay, outside the bay and in the watershed streams) and in coral tissues (mustard hill coral, Porites astreoides); and spatial and temporal patterns in sedimentation rates and surface water nutrient concentrations (NOAA, 2013)..

C. Organization's Historical Connection to the Affected Community

Puerto Rico is a relatively small island in the Eastern Caribbean and is approximately 40 miles by 100 miles. The team has been working together to improve water quality, safeguard human and coral reef health since 2008 when members of the project team completed a watershed plan for Guánica Bay in SW Puerto Rico. Since then we have been working to improve conditions in the Guánica watershed as well as other areas around the island. The Guánica watershed area which includes the adjacent La Parguera and its adjacent coral reef complexes in Puerto Rico's priority watershed areas. Since that time the team has worked to implement important projects to reduce contamination to the Guánica Bay and nearshore reefs. This has included:

1) Convening a scientific roundtable to establish methods for using hydroseeding/ hydromulching to stabilize bare soils. Investing in hydromulching equipment and stabilizing over 15 acres of bare soils in the watershed that were contributing to the sediment export and impacting the Bay and nearshore coral reefs.
2) Securing funding for treatment wetlands to reduce nutrient loads to Guánica Bay and overseeing the design of approximately 6 acres of treatment wetlands and are in the process of securing permits for construction.

3) Convening a technical roundtable to including farmers, academics, beneficiados (coffee buyers), agencies to create shade coffee criteria for Puerto Rico to help improve the economics of conservation grown coffee in the watershed and Puerto Rico.
4) The watershed plan and efforts by our partners NRCS and USFWS have resulted in over 1000 acres of sun coffee (associated with higher sediment loads and increased uses of pesticides, and fertilizers on very steep slopes) being transitioned to shade coffee which uses 4 species of trees including legume trees which fix nitrogen and create much higher vegetative cover on steep slopes and highly erodible soils where coffee is grown.
5) Creation of a Green Infrastructure Plan for La Parguera (the 1st in Puerto Rico) which included a local stakeholder process where the community, its fisherman and local businesses helped to chart a course for improvements in La Parguera. Followed the implementation of 3 green infrastructure projects in close partnership with the municipality to reduce sediment and contaminants in stormwater runoff from impacting nearshore coral reefs (include the NOAA Graphic). PDC has worked with the local community to implement these projects including local small businesses.
6) Identification of 25-30 potential sources of pollution/ water contamination to La Parguera nearshore waters and cooperative work with PRASA and EPA to have the problems addressed.
7) Creation of a community based watershed plan for the island of Culebra, (part of the Northeast Reserves that includes Fajardo) and the implementation of several dirt road stabilization projects, 3 acres of hydroseeding of a bare soil conveyance channel and a green infrastructure project which stabilized a bare soil parking lot and addressed stormwater runoff through green infrastructure practices and over a 100 volunteers from the community.
8) PDC effectively collaborates with the municipalities of Culebra, Vieques, Yauco, Lajas, and Guánica in all past and ongoing conservation efforts.

D. Project Description

The project's design follows the EPA's Environmental Justice Collaborative Problem-Solving Model. Step 1 of the process has been achieved, PDC as a civil society organization deeply concerned about the environment and Puerto Rico citizens' wellbeing, has identified the threat of land based sources of pollution as a priority to address for the benefit of current and future generations. The project's objective is to detect, track and reduce sediment, bacteria and nutrient loads from major sources of water contamination in four priority sites: Vieques, Rincón, Guánica and Fajardo, four unique areas facing serious water contamination issues. Through practical field activities that utilize rapid in-field water quality techniques and instrumentation where measurements are gained within 5 minutes and sources of pollution can begin to be tracked immediately to their sources including measuring indicators of contamination (ammonia (sewage), optical brighteners (washwater), Chlorophyll A (help determine locations of excessive nutrients in coastal waters) (Pitt and Brown, 2004). This effort and peer mentoring PDC will build capacity of NGOs, municipalities and interested volunteer community groups in order provide them with the skills, information, and resources they need to conduct water quality monitoring and establish effective communication with regulatory agencies responsible for environmental enforcement and water conservation. All collaborating partners have a history of efforts done independently that demonstrate their commitment with their communities and the environment. After sources of pollution are identified, each priority site team will draft a list of recommendations and actions to remediate these sources. This will be a team effort designed with a common vision and goals in

order to achieve a consensus about ways to solve the challenges in each area. All partners will play an important role by providing local knowledge about problematic areas they have already identified or suspect need attention, contribute their time to attend field and classroom activities, and establish relationships with key regulatory agency representatives to solve current and future water quality challenges. PDC and our partners will conduct a series of meetings and follow up visits to engage constructively the responsible parties and regulatory agencies in the decision making process to address and remediate pollution discharges.

Project Goals:

1. To perform fieldwork with local communities to determine sources of pollution using diagnostic water quality pollution indicators and standard tracking methods promulgated by EPA (developed in part by one of the project team and adapted to tropical coastal areas by members of the project team)
2. To transfer knowledge and the technology of pollution source reduction and elimination to local communities that currently do not have this capability.
3. To improve the knowledge and performance of agencies including the DNER, EQB, PRASA on methods to track and remediate sources of pollution.
4. To work with the communities and agencies including Municipalities, the EPA, PRASA and EQB to ensure that sources of contamination are remediated.
5. To provide the community with basic equipment necessary technical transfer to detect and remediate sources of pollution (building long-term capacity)
6. Develop partnerships between communities, and the local and federal authorities to enable more effective channels of communication and problem solving.

Project activities:

PDC in conjunction with partner organizations will organize and direct a kickoff meeting at each of the sites to establish project fieldwork schedule, mapping activities, include aerial imagery, CRIM (caudastal layer), as well as engage volunteers and other participants. In each of the sites the project team will conduct water quality testing and monitoring activities to identify and track sources of contamination. PDC in collaboration with Ridge to Reefs and the DNER, while in the field, will teach to the project team how to track sources of pollution and conduct water quality monitoring surveys. PDC anticipates to work five months at each of the priority sites to conduct the activities described above.

After all the fieldwork is completed at each site, PDC will write technical memos for the four locations and present reports at community meetings and conference calls to discuss findings among participants, including representatives from PRASA, EPA and EQB. We anticipate to draft four conceptual designs (one for each priority site) to be shared with responsible parties and regulating agencies in order that will assist them in remediating the sources of pollution. We recognize that some sources of pollution may require infrastructure fixes that take agencies longer to complete. In this regard collaborating partners will assist PDC in following up with responsible agencies after project completion. After completion of work in priority areas PDC will convene a plenary meeting of all project partners to provide updates on status of sources and share lessons learned. The following table describes the activities, timeline and milestones of the project.

Activity at each priority site	**Timeline**	**Milestone**

1. Kickoff meeting – coordinate project schedule, mapping, field dates, volunteers and other participants	Month 1	Kickoff meeting with project partners – adopt schedule and dates for project.
2. Prepare site mapping for fieldwork to include aerial imagery, CRIM (caudastal layer)	Months 1-2	Field maps with appropriate available layers
3. Conduct fieldwork – minimum of 2-3 teams working to identify and track sources of contamination	Month 3	Half day of training and technology transfer completed and 5 days of pollution source identification and tracking finalized(estimate of 20-30 sources of contamination identified)
4. Draft conceptual design for each of the priority sites that includes practical solutions to the sources of pollution found in each area.	Month 3-4	Conceptual design completed for each priority site.
5. Follow up visits with our partners and EPA, PRASA and EQB to resolve pollution sources	Months 3-4	Field visits with regulators to review sources of contamination and discuss potential strategies for remediation.
6. Technical Memo on summary of findings and remediation efforts	Months 4-5	Completion of technical Memo that includes mapping and summary of locations, sources and remediation of pollution sources.
7. Meeting of all partners to provide updates on status of sources and lessons learned	Month 22	Technical Memo of lessons learned and outcomes

Partners:

Surfrider Rincón Foundation

Fundación Surfrider Rincón (SFR) is a non-profit community-based grassroots/volunteer staffed group, and in 2009 was also chartered as an independent member chapter of Surfrider Foundation, the national 501 (c,3) nonprofit environmental organization registered in California. Surfrider now consists of 90 chapters worldwide, and about 50,000 members[5]. SFR was formed in 2001 primarily to develop and help realize the creation of the Reserva Marina Tres Palmas (RMTP). In addition, the chapter carries out other projects such as the only community-based weekly water testing program in PR, beach cleanups, reforestation events, recycling and solid waste management at local surfing contests, school presentations, and fundraising activities.

The role of SFR will be instrumental in the project as they will provide essential local knowledge about potential problem areas in Rincón and have effective outreach with the community and an on-going group of volunteers who monitor the entire northwest coast of PR. The signed Memorandum of Agreement (MOA) outlines the commitment that SFR has to the project which

[5] The Surfrider Foundation. 2014. http://rincon.surfrider.org/about/overvie/

is similar to the commitment of each of the other project partners: 1) participation in a half day of training for volunteers and community members in detection methods and tracking (water quality methods, mapping) and five days of fieldwork with at least four personnel and volunteers; 2) space for meetings, and water and snacks during these events; 3) after fieldwork is conducted, attend follow up meetings with responsible regulatory agencies and assist with drafting a technical memo to report status and resolution of sources of pollution.

Vieques Historical Conservation Trust (VHCT)
The VHCT was incorporated in 1985 as a non-profit Trust, under the laws of Puerto Rico. It is also a 501 (c) (3) corporation under US laws. Their mission is to foster, protect and conserve the environmental, archaeological and cultural resources of Vieques, Puerto Rico. One of the primary goals is to preserve and study the bioluminescent bays found on the island. The VCHT supports a broad array of educational programs for the community, with a special focus on children, through lectures, educational exhibits, seminars, summer programs, publications, computer resources and a unique Vieques scholarship program.[6] It is also concerned about contamination derived from anthropogenic and terrestrial sources and the impacts it may have on human health, as well as in freshwater and marine ecosystems. Furthermore VHCT is currently conducting an diagnostic assessment of septic systems in five communities in the north coastal areas of Vieques. The organization is currently conducting research to identify new technology that could potentially be utilized in these areas to improve water quality.

PDC and VHCT are current partners in a project (approved and to be funded by DNER) entitled: *Reduction of sediment loads to coastal waters through the implementation of Best Management Practices (BMPs) and native species re-generation to improve and delimit public access at Bahia Mosquito, Vieques Puerto Rico.* PDC and VHCT's partnership will be strengthened through this project and their relationship has been formalized through a duly signed Memoranda of Agreement (in attachments). VHCT has interest in identifying and addressing water quality issues as evidenced by its recent work on septic systems. VHCT's commitment to this proposed project can be found in the MOA established by the two organizations.

Ridge to Reefs, Inc.
Ridge to Reefs Inc. is a non-profit corporation dedicated to restoring watersheds and improving water quality. Ridge to Reefs' Director, Paul Sturm, is a former Director/Biologist for Center for Watershed Protection where he spent 11 years working on watershed plans, NPDES Guidance, support the creation and education of NPDES programs and implementation projects as well as code changes in the Chesapeake Bay watershed and around the Country. Paul also has extensive experience in writing and implementing watershed plans in Puerto Rico including Guánica, La Parguera and Culebra. He has expertise in IDDE monitoring, erosion and sediment control, public education, and green infrastructure stormwater practices and has taught classes and provided trainings in each of these disciplines including leading the monitoring portion of an EPA National Webcast on IDDE as well as helping define the monitoring approach in the EPA's promulgated guidance on IDDE (Brown and Pitt, 2004). He has written five QAPP plans. He has also worked closely with Natural Resource Conservation Services (NRCS-USDA), NOAA, EPA, and the U.S. Fish and Wildlife Service to implement a priority watershed plan for the US Coral Reef Task Force in the Guánica watershed in Puerto Rico. PDC and RTR are current partners in the following

[6] VHCT. 2014. http://vcht.org/about/our-history-at-a-glance/

projects: Design and Implementation of La Parguera Green Infrastructure Plan, Design and Implementation of Culebra Watershed Management Plan, Hydroseeding Project in Guánica, Treatment Wetlands at Guánica Wastewater Treatment Plant, Coordination and Implementation of the Guánica Watershed Management Plan, Design and Implementation of Cabo Rojo Watershed Management Plan, and Implementation of BMPs in Culebra. PDC and RTR have formalized their partnership through a Memoranda of Agreement (see attachments). Both organizations will collaborate in the coordination and implementation of the project for the four priority areas already mentioned. For this project, RTR will assist in the coordination of logistics and technical tasks, co-facilitate a half day training in detection methods and tracking, co-lead five days of fieldwork in each of the four priority areas, attend meetings with EPA and PRASA, and co-lead drafting technical memos and reporting on status and resolution of pollution sources.

Kayaking Puerto Rico

Kayaking Puerto Rico (KPR) is a for profit entity that offers eco-tours to visitors in Fajardo since 2006. They are an environmentally conscious group led by Dalberto Arce, KPR's President. KPR's team, which includes approximately 32 employees (a majority are Fajardo citizens), offers tourists not only with in-water sport activities such as snorkeling, kayaking and rafting, but also incorporates educational environmental awareness talks in their tours and organizes coastal clean-up events in the areas of Laguna Grande, Seven Seas Beach and Cordillera Reefs Natural Reserve in Fajardo. FPR is looking forward to collaborate in efforts to improve water quality in the area as it is in their best interest to conserve the integrity of coastal resources as well as ensure that water contact sports are safe for all of their clients. For this purpose they have signed a Memoranda of Agreement similar to the other partners agreements (see attachments) with PDC. As KPR is on the water every day of the year, they can help be the eyes and ears of identifying contamination issues in the Fajadro area. KPR will be joined by the local fishers association as the community representatives and partners in the Fajardo area.

Asociación de Pescadores de Maternillo y Mansión del Sapo (APM)

APM is a Fajardo based fisher folk association that will closely collaborate with KPR in this priority site. They are an environmentally conscious community group committed to this initiative. PDC and RTR have formalized their partnership through a Memoranda of Agreement (see attachments).

Department of Natural and Environmental Resources (DNER)

The DNER is the leading organization for conserving and protecting Puerto Rico's natural resources. The DNER's Coastal Zone Management Program (CZMP) is committed to support this initiative as it is one of their priorities to counteract the impacts derived from sources of pollution. The CZMP will provide technical assistance as well as help in bringing other partners to initiative including, the EQB, PRASA, and EPA. PDC and DNER have a solid partnership history since PDC's establishment in 2011. PDC and DNER are current partners in the following projects: Design and Implementation of La Parguera Green Infrastructure Plan, Design and Implementation of Culebra Watershed Management Plan, Hydroseeding Project in Guánica, Wetlands Treatment for Wastewater at Guánica Treatment Plant, Coordination and Implementation of the Guánica Watershed Management Plan, Design and Implementation of Cabo Rojo Watershed Management Plan, Implementation of BMPs in Culebra, Evaluation of Economic Feasibility of the Restoration of the Guánica Lagoon.

E. Organizational Capacity and Programmatic Capability

Protectores de Cuencas, Inc.

Protectores de Cuencas (PDC) is a science and community based nonprofit organization helping to restore and protect watersheds (Cuencas in Spanish) across the archipelago of Puerto Rico. We maintain a growing network of collaborative interagency level support, both from Puerto Rico's government agencies, municipal mayors, as well as federal agencies such as NOAA and the NRCS, among others. The organization is composed of two co-directors, an environmental projects coordinator and a public health and water quality scientist. The two co-directors include: Roberto Viqueira, a biologist with over 12 years of experience in water quality and natural resources management and former lead biologist with the Guánica Dry Forest and an agronomist Louis Meyer- Comas who has turned his focus toward conservation after over 40 years of experience in sustainable and organic farming. PDC's office is in Yauco, PR, however our scope is island-wide. Glenis Padilla is our environmental projects coordinator with an undergraduate degree in Biology from Inter- American University of Puerto Rico and a dual Master's degree from American University in Washington D.C./ University for Peace in Costa Rica in International Affairs and Natural Resources and Sustainable Development. Glenis has worked at the Pan American Health Organization and the Inter-American Development Bank as well as a Biologist for NOAA CRCP Program in Puerto Rico. Jeiger Medina, public health and water quality scientist, recently completed his Master's Degree from University of Puerto Rico Medical Sciences Campus in Environmental Health studying the ecological impact of bacteria and sediments on shallow coral reef ecosystems.

PDC is well versed and experienced in regards to dealing with land based sources of pollution and watershed protection as it has worked to adapt the EPA Guidance on illicit discharge tracking to Puerto Rico and tropical coastal ecosystems. It also received training from the Center for Watershed Protection on illicit discharge detection and elimination while working on the elaboration of Guánica Watershed Plan. PDC has also participated in the creation of the *La Parguera Green Infrastructure Plan* as well as led the follow up implementation of three green infrastructure projects in La Parguera including the construction of a biofilter. In addition PDC was closely involved in the efforts to identify sources of contamination in La Parguera helping to lead the field effort that included monitoring nearshore coastal waters for indicators of contamination as well as visual inspections on land and tracking of potential sources of contamination where elevated concentrations were found in the nearshore environment. From that work, a report was produced which identified over 25 potential sources of contamination within La Parguera. PDC also coordinated follow up field visits and meetings with EPA and PRASA where EPA defined a set of actions that PRASA needed to take to address many of the findings together with responsible parties (private residences and businesses) where sewage leaks were occurring. PRASA subsequently produced a report which summarized their efforts addressing the identified issues.

In addition, PDC is helping lead efforts in Culebra, PR to complete a community based Watershed Management Plan, meeting EPA's A-I Criteria for Watershed Planning. It has led the outreach efforts to engage the community in the preparation of the watershed management plan including the fieldwork, early implementation actions (where over 100 volunteers have participated in efforts to address sediment and nutrients from stormwater runoff and bare soils), and water quality and

tracking fieldwork in collaboration with DNER, and monitoring coastal waters and tracking sources of contamination on land and in small drainages on the island with residents, agencies and students from the University of Puerto Rico. The effort identified over 20 sources of contamination on this small island with 1900 residents and is working with EPA, PRASA, USDA Rural Development, and the municipality to address the sources of contamination which include: leaking sewage, failing septic systems, an underperforming sewage treatment plant, and illicit discharges from schools, residences and businesses.

From 2011 to 2014 PDC, was granted $78,000, through the National Fish and Wildlife Foundation (NFWF) for the project *Organizational Capacity Building for Guánica Watershed*, funding source/CFDA number: Natural Resources Conservation Services (FC.R134) 10.902, supervised by project officer: Michelle Pico. The funds were utilized for: the legal incorporation of PDC as a non-profit organization; long-term capacity building in Guánica Watershed; and soil stabilization of bare soils in the watershed. PDC has demonstrated capacity for the sound management of public and federal funds by complying with all requirements, delivering results and by providing accurate progress reports, financial records and other required information on a timely manner. For 2014, PDC has a projected budget of over of $400,000. Below is a list of projects in which PDC currently or in the recent past has served as a contractor through other partners, such as DNER, NOAA and Ridge to Reefs, to conduct watershed restoration and conservation in Puerto Rico: La Parguera Green Infrastructure Plan, Cabo Rojo Watershed Management Plan, Hydroseeding within the Guánica Watershed, Wetland Treatment at Guánica Sewage Treatment Plant, Coordination and Implementation of Guánica Bay Watershed Management Plan, Culebra (part of Fajardo East Reserves) Watershed Management Plan, Implementation of BMPs in Culebra (part of Fajardo Eastern Reserves), Study: Socioeconomic Feasibility of Guánica Lagoon Restoration, Sediment and Erosion Control Workshops for Heavy Machinery Operators.

An experienced accountant is retained to provide oversight on financial operations and help manage the annual financial reports and ensure best financial practices. Roberto Viqueira, Director of PDC, will also be responsible for this task. In order to effectively manage and successfully complete the proposed project PDC will: follow work plan, respect timeframe of expenditures, and MOAs; maintain close communication with key partners before, during and after project implementation; track success by utilizing milestones and performance measures; adapt and make adjustments as necessary to achieve project goals.

F. Qualifications of the Project Manager (PM)

The Director of Protectores de Cuencas, Mr. Roberto Viqueira Ríos will be the Project Manager of the proposed initiative. Roberto Viqueira has a Bachelor's degree in Biology from the Inter-American University of Puerto Rico, and 40 credits towards a MA degree in Marine Science in Geology/Oceanography, University of Puerto Rico, Mayaguez. Roberto has over 10 years experience in Biology, Marine Biology, Resource Management, Community Engagement and Restoration Coordination. Roberto has worked closely with the creation of a watershed plan for Guánica while a biologist with the UNESCO designated International Biosphere Reserve Guánica Dry Forest and since then has worked to coordinate restoration projects and interagency efforts to restore and protect the watershed. As Biologist for the Guánica Dry Forest he: analyzed anthropogenic impacts to natural areas, conducted restoration of sand dunes and sedimentation control, reconstruction of natural wetlands, and supervised personnel, interns and volunteers.

Roberto also has extensive laboratory experience working for CECIA (Center for Environmental Education, Conservation and Research) at Inter-American University in San German for 5 years analyzing water quality including nutrients, bacteria and Chlorophyll A, maintaining laboratory equipment, and conducting extensive fieldwork much of it on coastal pollution.

Roberto is skilled at maintaining relationships with the local Mayors and municipalities who have been engaged in the restoration of the Guánica watershed. He has experience and training in erosion and sediment control, reforestation, and stormwater management. Roberto has also co-led the Shade Coffee Roundtable and worked with farmers, academics, coffee buyers to set environmental standards for shade grown coffee certification. He led efforts to create a farm inventory for the Lajas Valley and led the field efforts for an interagency group working to perform a soil salinity and hydrologic study of the Valley. This effort was vital to providing a scientific basis for the restoration of Guánica lagoon while minimizing negative impacts to agriculture. He performed fieldwork for both the Guánica Bay/Rio Loco Watershed Restoration Plan and a Green Infrastructure Plan for the town of La Parguera both in Southwest Puerto Rico. Furthermore, he helped develop and test methods for hydroseeding in high mountain areas of Puerto Rico to stabilize highly eroding soils. Successfully stabilizing slopes of 3-5%, 70% and 85% slopes with high germination rates, good stabilization and transition back to native forest.

Viqueira has extensive water quality, watershed management and restoration experience. This includes water pollution tracking experience in La Parguera and Culebra where he helped adapt IDDE guidance to coastal and tropical waters assisted in the elaboration of a Watershed Management Plans (Pitt and Brown, 2004). He also performed training and outreach with Culebra local landowners and heavy machinery operators which led to the successful implementation, in conjunction with other partners, of a watershed restoration project to control and prevent sedimentation and pollution in the reserve. In addition, he is currently working with VHCT to implement BMPs for the protection of the Bahia Mosquito Bioluminescent Bay. He is also implementing and directing a series of sediment and erosion control workshops for heavy machinery equipment operators in locations around the island.

G. Past Performance in Reporting on Outputs and Outcomes

Project: Organizational Capacity Building for Guánica Watershed 0302.11.029951
Funder: National Fish and Wildlife Foundation. **Funding Source/CFDA number**: Natural Resources Conservation Services (FC.R134) 10.902. **Project Contact:** Michelle Pico

Proposed Outputs	**Actual Outputs**	**Proposed Outcomes**	**Actual Outcomes**
Technical roundtable to establish hydroseeding methods for exposed soils in Puerto Rico	Development of several recommended hydroseeding mixes – establishment of test plots	Defined methods for hydroseeding in Puerto Rico	Technical Memo with defined and tested hydroseeding methods
5 acres hydroseeding	5 acres hydroseeding	Soils stabilized	Technical memo summarizing acres stabilized

3.9 acres stabilized	3.9 acres stabilized	Soils stabilized and reduction of sediment transport to Guánica Bay	Summary memo for project and stabilized soils impacting Guánica Bay
Creation of a website and logo for Protectores de Cuencas	Creation of a website and logo for Protectores de Cuencas	Increased capacity and exposure for the NGO	Increased capacity and exposure for the NGO
NGO incorporation and defining the Board of Directors	NGO Incorporation in Puerto Rico and establishment of a Board of Directors	Increased organizational capacity and oversight	Increased organizational capacity and oversight
Prioritization of areas for hydroseeding in the watershed	Prioritization of areas for hydroseeding in the watershed	Establish the needs and opportunities for restoration	Establish the needs and opportunities and contacted land owners

H. Expenditure of Awarded Grant Funds

The timeline for expenditures is 24 months. Spending is as follows:

1) Months 0-6 – Equipment Purchases and Illicit Discharge Detection with Community #1 Rincón - $45,000
2) Months 6-12 – Community #2 $25,000 Fajardo Illicit Discharge Detection and Elimination
3) Months 12 -18 – Community # 3 Vieques $22,444
4) Months 18-24 – Guánica and Reporting $22,444

I. Quality Assurance Project Plan (QAPP) Information

A QAPP plan will be created for this work due to the collection of water quality data as part of the tracking component of the effort. The goal is to use rapid methods and water quality indicators to help trace indicators of contamination to their source. Many of the methods being used are EPA standard methods including Chlorophyll A, optical brighteners, and one of the ammonia methods and two bacteria methods. However, there are two low cost methods sometimes used that are not EPA standard methods: 1) an ammonia method and one of the bacteria methods used for screening and tracking; as the primary goal for this effort is to track down the source of contamination not merely collect scientific data (Brown and Pitt, 2004).

The preparation of the QAPP plan will assist the local organizations and municipalities in helping to ensure that data collected is viewed as viable data by the Environmental Quality Board and Puerto Rico Sewer and Water Authority and other regulatory agencies.

II. Project Performance Measures

Performance Measures / Milestones			
Resources Inputs	**Activities**	**Outputs**	**Outcomes**

- Staff time - Volunteers - Partnering Organizations	Kickoff meeting – coordinate project schedule, mapping, field dates, volunteers and other participants at each priority site.	- Meeting Minutes - Schedule of activities and set dates.	Develop partnerships between communities, and the local and federal authorities Performance measure: Number of meeting participants.
- Staff time - Volunteers - Partnering Organizations	Prepare site mapping for fieldwork to include aerial imagery, CRIM (caudastal layer) at each priority site.	- Field maps. - Identification of priority areas to be visited	Develop partnerships and obtain local knowledge of potential problem areas. Performance measure: MOA responsibilities are accomplished. Maps created. Number of partners that participate in mapping activities.
- Staff time - Volunteers - Partnering Organizations - Regulatory Agencies	Conduct 5 days of fieldwork – minimum of 2-3 teams working in different areas to identify and track sources of contamination	- Conceptual design completed for each priority site.	-To transfer knowledge and the technology to local communities. -To determine sources of pollution using diagnostic water quality pollution indicators and standard tracking methods approved by EPA. -To improve the knowledge and performance of agencies including the DNER, EQB, PRASA on methods to track and remediate sources of pollution. Performance measure: Number of participants at the 5 fieldwork days at each site. Before and after survey to measure technology transfer.
- Staff time - Volunteers - Partnering Organizations - Regulatory Agencies	Follow up visits and continued coordination with EPA, PRASA and EQB to resolve pollution sources	- Field visits with regulators to review sources of contamination and discuss potential strategies for remediation. - Meeting Minutes	To improve the knowledge and performance of agencies including the DNER, EQB, PRASA on methods to track and remediate sources of pollution. Performance measure: Number of participants at each meeting. Conduct unstructured interviews to assess agency's capacity.

-Staff time	Produce a technical memo.	- Technical Memo on summary of findings and remediation efforts	To work with the communities and agencies including the EPA, PRASA and EQB to ensure that sources of contamination are remediated. Performance measure: Completion of technical memos. Number of follow up meetings to solve sources of pollution. Number of sources of pollution identified, and number of sources of pollution solved during the project duration.
- Staff time - Volunteers - Partnering Organizations - Regulatory Agencies	Meeting of all partners to provide updates on status of sources and lessons learned	-Meeting Minutes -Presentation on findings and recommendations	-To improve the knowledge and performance of agencies including the DNER, EQB, PRASA on methods to track and remediate sources of pollution. -To transfer knowledge and the technology of pollution source reduction and elimination to local communities that currently do not have this capability. Performance measure: Number of participants to meeting. Conduct a final evaluation questionnaire.

Work cited:

Bonkosky, M., E.A. Hernández-Delgado, B. Sandoz, I. Robledo, J. Norat, & H. Mattei. 2009. *Detection of spatial fluctuations of non-point source fecal pollution in coral reef surrounding waters in southwestern Puerto Rico using PCR-based assays*. *Mar. Poll. Bull.* 58:45-54.

Brown, E., and R. Pitt. 2004. *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments*. Center for Watershed Protection, Ellicott City, MD. [http://cfpub.epa.gov/npdes/stormwater/menuofbmps/illicit.cfm]

Cordero, L., J. Norat, H. Mattei and N. Cruz (2012). Seasonal variations in the risk of gastrointestinal illness on a tropical recreational beach. Journal of Water Quality and Health;10:579-593.

Departamento de Recursos Naturales y Ambientales. 2009. *Plan de Manejo de la Reserva Natural Arrecifes de la Cordillera, Fajardo.*

Granna-Raffucci, Felix A.; García-Perez, Mayra T. 1993. Nonpoint Source Pollution at the Fajardo River Basin, Puerto Rico. http://www.gpo.gov/fdsys/pkg/CZIC-td231-p8-g73-1993/html/CZIC-td231-p8-g73-1993.htm

Medina, J. and E. Hernandez-Delgado (2010). Ecological impacts of a fecal pollution gradient in the community structure of shallow-water coral reefs in Culebra Island, Puerto Rico. MSc. thesis dissertation. University of Puerto Rico, Graduate School of Public Health.

Newsroom El Mundo Puerto Rico. 2013. *Senate oversees the AAA in the case of Las Croabas in Fajardo.* http://english.elmundo.pr/4353/58700/a/senate-oversees-the-aaa-in-the-case-of-las-croabas-in-fajardo

Norat, J. and H. Mattei, 2006. Inventory of Septic Tanks as a Source of Pollution in Belvedere. Final Report submitted to the Department of Natural Resources of the Commonwealth of Puerto Rico Department of Environmental Health. Graduate School of Public Health Medical Sciences Campus University of Puerto Rico.

Norat Ramírez, José; Méndez Lázaro, Pablo; Hernandez-Delgado, Edwin A.; Cordero Rivera, Lysbeth. 2011. *El Impacto de los Pozos Sépticos en la Calidad de Agua y los Arrecifes de Coral en la Reserva Marina de Tres Palmas (Rincón-Puerto Rico*).XI Congreso Regional para Norteamerica y El Caribe sobre Ingeniería Sanitaria y Ambiental - Región I de AIDIS "Retos Ambientales y Oportunidades en Norte América y el Caribe".

Sturm, P., Viqueira-Rios, R. and L. Meyer Comas, 2014. Community Watershed Action Plan for Water Quality and Coral Reefs. Report to NOAA Coral Reef Conservation Program. Ridge to Reefs/Protectores de Cuencas. February 2014.

Whitall, D., L.J. Bauer, C. Sherman, K. Edwards, A. Mason, T. Pait, and C. Caldow. 2013. National Oceanic and Atmospheric Administration. *Baseline Assessment of Guánica Bay, Puerto Rico in Support of Watershed Restoration.*